Analysis of Regional Pipeline System's Ability to Deliver Sufficient Quantities of Natural Gas During Prolonged and Extreme Cold Weather (Winter 2017-2018)

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Skipping Stone previously analyzed the justification for PennEast as required to provide year round service, or even to ostensibly meet peak winter demand, and found no evidence that it was required.¹

See Analysis of Reliability in Electric and Gas Markets, Cost Savings and Project Need (Nov. 28, 2016); PennEast Analysis of Alternatives (Sept. 12, 2016); Analysis of Public Benefit Regarding PennEast Pipeline (Mar. 9, 2016). Skipping Stone hereby updates that analysis with the data from the most recent winter to date², and presents its results.

When assessing the need for additional interstate pipeline capacity, the central question should be whether the current pipeline system is able to deliver sufficient quantities of natural gas under stress; more specifically, during prolonged and extreme cold weather. The recent period of historic and prolonged cold weather in December 2017 and January 2018 provides an excellent opportunity to address this central question.

Our analysis shows that gas flow for this region is now bi-directional, which has greatly expanded the available delivery capacity, without the addition of additional, pipeline capacity into the subject region. In fact, recent performance shows that the system delivered in Zones 5 and 6 ~23% more natural gas than the total contracted delivery capacity on the Transco pipeline in Zones 5 and 6. This growth in delivered capacity has occurred with capacity in existence as of this writing, i.e., without building any additional pipeline capacity into the subject regions. The growth results from the bi-directional flow of gas in the Transco system, which allows for multiple deliveries within and across Zones using the same pipeline path.

This analysis shows that PennEast is not needed to meet peak winter demand, not even for a single day, even during extreme weather events. Given the addition of Atlantic Sunrise capacity by June 2018, which increases capacity in the region by another 14%, and the existence of substantial, in-region, interstate-pipeline connected, peaking supplies³, it is difficult to imagine any scenario for at least a decade where additional pipeline capacity will be required.

Background

Transco is one of five major interstate pipeline networks that enter, exit or run through New Jersey. Transco, a major supplier to the region, is the predominant destination for more than 90%+ of proposed PennEast supplies and thus examination of the physical and market dynamics evidenced on Transco this past winter provides an important and dispositive insight into the central question under study. On the Transco system, New Jersey is located in Zone 6, which runs from Maryland to New York City and Long

¹ FERC's Order correctly notes that projects like PennEast are typically aimed at addressing only peak demand.
² The data for the winter to date includes data encompassing the weather episode referred to as the “bomb-cyclone” and/or the “bomb-o-genesis”
³ There are LNG vaporization facilities connected to Transco: 1) in the Zone 6 NY pricing region of Transco; 2) from the Cove Point MD LNG Terminal which feeds Transco near the Zone 5/6 border; 3) in Zone 6 Philadelphia; and 4) by contract on Algonquin where a Transco shipper receives LNG in Providence RI into Algonquin which delivers the receipt quantity by "backhaul" to Transco outside NY for delivery by Transco to the Transco Shipper in NYC.
Island. South of Transco’s Zone 6, is Transco’s Zone 5. Zone 5 runs from ~the Georgia/South Carolina Border to the Virginia/Maryland border.

Generally, pipeline capacity, while fully subscribed, is fully utilized only during extreme cold weather, when heating needs are fully met and electric generation plants and other customers with interruptible contracts use the remaining available capacity in the secondary market\(^4\). Historically, pipelines in the New Jersey region were fully utilized only 20-30 days per year, and depending on cost and availability of peaking supplies, new pipeline capacity may be warranted when existing pipeline capacity is fully utilized to meet firm demand around 50 -60 days per year. Traditionally, LDCs are the primary customers for firm capacity, as they are required to ensure that pilot lights do not go out for residents and businesses, especially during prolonged periods of cold weather.

Historically, Transco’s supply sources were located in Texas and the Gulf Coast and brought to the Northeast throughout the year. This analysis shows that the historic pattern has changed and that Transco is no longer a uni-directional system. With uni-directional flow, the amount of gas that could be delivered was constrained by the physical, forward haul, capacity of the pipeline, resulting in full utilization 20-30 days per year.

The direction of gas flow in the mid-Atlantic and Northeast region has changed significantly in the past few years for several reasons. First, large quantities of natural gas are now supplied from the Marcellus region, into Transco at locations in Zone 5 and Zone 6. Second, substantial new pipeline capacity has been added both to Transco and to other pipelines in the region (many of which connect, and deliver gas, to Transco) since 2011.

\(^4\) Pipeline capacity into, out of, and throughout the Northeast is “fully subscribed”. “Fully subscribed” means that were every contract to be scheduled from primary receipt point(s) to primary delivery point(s) up to the Maximum Daily Transportation Quantity on the contract, there would be no remaining firm, primary to primary, capacity that the pipeline would have available to sell. Fully subscribed does not take into account use of, or possible amount of, firm capacity available for transacting deliveries through segmentation. Neither does fully subscribed mean fully utilized even on a once through (i.e., no segmentation) basis. During periods of less than full utilization, a pipeline can sell interruptible capacity and/or contract holders can release (sell) a portion of their unutilized firm capacity to others; both of which are commonly referred to as the “secondary market”.

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New analysis of recent peak demands

Exhibit 1. Analysis of Transco pipeline contracted capacity and deliveries during recent period of winter peak demand

Our analysis is shown in Exhibit 1. During the period from November 1, 2017 through January 20, 2018, analysis of gas contracts and deliveries on the Transco pipeline in Zone 6 shows that

- The contracted delivery capacity in Zone 6 was 4.9 billion cubic feet per day (Bcf/d). This total is the maximum “firm” capacity contracted by LDCs and others to locations in Zone 6. (depicted by the green line)
- Most days, holders of firm capacity do not actually use all of this capacity, even during winter months. On average, 4.1 Bcf/d was utilized to deliver to Zone 6 locations (the brown line) during this period evidenced by the average of actual scheduled deliveries.
- The data shows that scheduled deliveries by Transco (depicted by the light blue line) were (and resultant utilization of Zone 6 capacity was) higher than the maximum contracted Zone 6 delivery capacity on many days. In Zone 6 alone, at its peak, the system delivered more than 5.23 Bcf/d. This means that the system delivered ~300 million cubic feet per day more than the maximum contracted delivery capacity, an increase of ~6% over contracted delivery capacity.

All contract data obtained from Transcontinental Gas Pipe Line Informational Postings, Index of Customers listing for 01/01/2018. All Scheduled Quantity data obtained by direct computer to computer electronic data interchange from pipeline database that also displays data on the pipeline’s informational postings of Operationally Available (OA) capacity. OA data provides the scheduled quantity at every location as well as the remaining “operationally available” quantity at such location. Each location’s scheduled quantity is identified as a “receipt” or “delivery” quantity.
• Notably, even on the highest Zone 6 demand day on the Transco system, there remained 1.7 Bcfd of capacity through Zone 6 (i.e., in addition to the contracted delivery capacity into Zone 6) that was not utilized to meet Zone 6 demand.

The high level of Zone 6 deliveries plus the 1.7 Bcfd of remaining, Path, capacity through Zone 6 to the south shows that there is now “extra” capacity that is available to provide natural gas to customers in Zone 6’s region that did not exist when the Transco line was uni-directional and flowing to the north from the Gulf Coast during the winter months.

Below, in Exhibit 2 is analysis of Transco pipeline contracts and deliveries during the same recent period of winter peak demand encompassing Transco Zone 6 plus the mid-Atlantic region of Transco (i.e., Zone 5).

Exhibit 2.

This Exhibit 2 analysis shows that:

• The contracted delivery capacity in Zone 5 and Zone 6 was 7.4 Bcfd). This total is the maximum “firm” capacity contracted by LDCs and others to locations in Zones 5 and 6. (depicted by the green line)

• Most days, holders of firm capacity do not actually use all of this capacity, even during winter months. On average, ~7.1 Bcfd (depicted by the brown line) was utilized during this period evidenced by actual scheduled deliveries. Thus, on average, at least 300 million cubic feet per day of the capacity was available to others in the secondary market.

• Scheduled deliveries by Transco (depicted by the light blue line) were (and resultant utilization of combined Zones 5 & 6 capacity was) often higher than the sum of the maximum contracted Zones 5 and 6 delivery capacity. At its peak, the system delivered more than 9.6 Bcfd. This means that the system delivered ~2.2 Bcfd more than the maximum contracted delivery capacity, an increase of ~23% over combined, contracted, delivery capacity.
The data also shows that segmentation (discussed below) allowed even higher deliveries on the coldest days when demand was highest. Up to **500 million** cubic feet per day (MMcf/d) or **0.5 Bcfd** of additional deliveries were made through segmentation on the coldest days. (the blue peaks above the light blue line)

The high level of deliveries shows that there is now “extra” capacity that is available to provide natural gas to customers in both the Zone 5 and Zone 6 regions that did not exist when the Transco line was unidirectional and flowing to the north during the winter months.

Below, in Exhibit 3 Skipping Stone presents the net “mass balance” view of Zone 6 during the same time period presented in Exhibits 1 and 2. A net mass balance for a zone of a pipeline system is the sum of all scheduled receipts in that zone over a time period minus all scheduled deliveries in that zone over the same time period. For our purposes the time period is, for each point plotted, a single day. Under this analysis a negative number indicates that there are more deliveries out of the pipe in the Zone than receipts into the Zone; and, a positive number indicates there is an excess of receipts in the zone; in which case the gas has to leave Zone 6 and proceed to Zone 5 (i.e., move southward towards the Gulf Coast).

As can be seen in Exhibit 3, above, even on the day of highest prices and highest deliveries to Zone 6 locations, there was net southward export of Zone 6 receipts to Zone 5. This means that the root cause of the episode of highest NY price was not related to the availability of gas in Zone 6, because Zone 6, on

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6 Scheduled receipts include scheduled withdrawals from storage (a receipt into the pipelines) as well as scheduled injections into storage (a delivery out of the pipeline).

7 Transco does not have a Zone 7 and all deliveries to other pipelines in Zone 6 are counted as Zone 6 deliveries.
that day was exporting gas to Zone 5; but rather, an inability of NY to receive supplies from Transco at the pertinent NY Zone 6 pricing locations that are reported to the trade press.\(^8\)

Below, in Exhibit 4, Skipping Stone presents a “what-if” chart. The what-if pertains to how the net flows of Transco Zone 6 would have looked had the final quantity of Transco capacity associated with the Atlantic Sunrise Project been on line and fully utilized over the subject time period, instead of it being available under the Transco schedule of ~June 2018.

![Exhibit 4](image)

As presented above, had Atlantic Sunrise come online 6 or more months early and been fully utilized, on the highest priced day, fully 1.5 Bcf\(d\) would have been available for incremental load in Zone 6 or more likely for export southward to Zone 5. Keep in mind that this is 1.5 Bcf\(d\) of excess capacity, on the highest priced and highest Zone 6 demand day, and it represents \(~1\frac{1}{2}\) “PennEast-worth” of capacity, before PennEast were to lay even one mile of pipe.

In addition, the result of a bi-directional pipeline, in a region well supplied by other interstate pipelines, is that the system itself has become highly reliable, and can compensate for major disruptions with no loss of service.

As shown above, the pipeline flow for this region is now bi-directional, which greatly expands the available capacity, without the addition of new pipes in the ground. Extra deliveries are possible because capacity owners can schedule multiple receipts and deliveries along their “contracted paths” within these zones. These shippers have rights to the “path” between their contracted receipt and delivery points; and, can segment this capacity and use it to deliver gas through that capacity in a myriad

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\(^8\) The “Zone 6 NYC” pricing point is generally considered the Consolidated Edison and National Grid city gate locations as well as some far eastern Essex, Union, and Middlesex county locations in New Jersey.
of ways. Imagine a line that runs from South to North; and, as shown below, from the receipt point at “A” to a delivery point at “F”.

Contracted Capacity is 10,000 Dthd From A to F

![Diagram of pipeline system]

10,000 used
A to B

10,000 used
C to D

10,000 used
E to F

Through Segmentation, Path Capacity Used is 30,000 Dthd on Path between A and F

Exhibit 5.

Further, imagine A is in Zone 4; B, C, and D are in Zone 5; and, E and F are in Zone 6. For example, as pictured above, the shipper with 10,000 Dthd from A to F can receive gas in Zone 4 to deliver in Zone 5, and then obtain additional gas in Zone 5 to drop off further along in Zone 5; then pick up additional gas (ex. at point “E”) and deliver it to point “F” further along in Zone 6. This is referred to as segmentation and enables a 10,000 Dthd path to be used, as in this example to transact use of the path to move 30,000 Dthd (i.e., 3 fold the contracted path capacity). This strategy allows for multiple deliveries within and across Zones as long as no more than 10,000 Dthd is being used along any segment – in other words no overlapping is permitted. Moreover, while the above graphic depiction of path “A to F” (south to north) exists today, Atlantic Sunrise and other recent Transco projects that have already come into service have created “F to A” (north to south) paths of capacity which can be scheduled simultaneously with “A to F” paths of capacity. This pathing (A to F and F to A) enables at a minimum the 9.1 Bcfd of capacity on a once through basis and as shown in Exhibit 2 enabled the 9.6 Bcfd of deliveries through segmentation of the Path capacity.

The data shown above in Exhibit 2 and Exhibit 4 demonstrate that during this period of high demand, existing path capacity added 23% to the capacity available to serve loads reflected by firm delivery point contracts (i.e., the total of which are represented by the green line in Exhibit 2); and when supplemented by the capacity coming on line in mid-2018 with Atlantic Sunrise’s completion, the 9.1 Bcfd of combined Zone 5 and Zone 6 Path capacity will become 10.4 Bcfd or 140% of (and ~3.0 Bcfd greater than) the currently existing 7.4 Bcfd of contracted delivery point capacity to Zones 5 and 6 locations.